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EXAMINER

LIANG, LEONARD S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 03/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/875,619

Applicant(s)

DIXON ET AL.

Examiner

Leonard S. Liang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2005 and 04 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,35-37 and 65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-3,35-37 and 65 is/are allowed.
- 6) ☒ Claim(s) 4,6 and 7 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

In the response filed on 01/04/06, the applicant requested that the examiner amend the drawings as shown in the attached replacement sheets. However, the examiner found no such replacement sheets. The examiner requests that the applicant submits the replacement sheets.

Specification

The amendments to the specification filed on 01/04/06 are approved.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rezanka (US Pat 5818485) in view of Williams (US Pat 5602574).

Rezanka discloses:

- {claim 4} Droplet deposition apparatus (figure 1); an array of fluid chambers, each chamber communicating with an orifice for droplet ejection, a common fluid

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inlet manifold and a common fluid outlet manifold (figure 1-2, reference 16, 18); each chamber so connected with the inlet manifold and the outlet manifold as to enable a fluid flow from the inlet manifold, through each chamber in the array and into the outlet manifold, the fluid flow through each chamber being sufficiently greater than the maximum flow through the orifice to prevent foreign bodies in the fluid from lodging in the orifice (figure 1-2; abstract; column 1-2; column 3, lines 15-40); the resistance to flow of one of the inlet and outlet manifolds being chosen such that the pressure at a fluid inlet to any chamber in the array varies between any two chambers by an amount less than that which would give rise to significant differences in droplet ejection properties between the two chambers in the array (abstract; column 1-2; column 3, line 54-column 4, line 18)

- {claim 6} wherein the array of chambers is linear
- {claim 7} wherein the array is angled to the horizontal and the inlet manifold extends parallel to the array, the properties of the inlet manifold varying in a direction lying parallel to the array in such a way as to substantially match the rate of pressure loss along the inlet manifold due to viscous losses in the inlet manifold to the rate of increase of static pressure along the inlet manifold due to gravity (figure 1, reference 18; abstract; column 1, line 35-column 2, line 38; column 3, line 54-column 4, line 18)

Rezanka differs from the claimed invention in that it does not disclose:

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- {claim 4} a piezoelectric actuator associated with each chamber for establishing an acoustic wave in fluid within the chamber to effect droplet ejection; fluid flow from the inlet manifold enabled simultaneously with the establishment of an acoustic wave within the chamber to effect droplet ejection from the orifice

Williams discloses:

- {claim 4} that an ejection mechanism can take on a variety of forms, such as thermal printhead or piezoelectric (column 1, lines 50-54); thus Williams teaches that piezoelectric and thermal technologies can serve as equivalent replacements for each other

It would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the thermal actuator of Rezanka with a piezoelectric actuator as taught by Williams. The motivation for the skilled artisan in doing so is to gain the benefit of producing sharper images. The combination naturally suggests a piezoelectric actuator associated with each chamber for establishing an acoustic wave in fluid within the chamber to effect droplet ejection and fluid flow from the inlet manifold enabled simultaneously with the establishment of an acoustic wave within the chamber to effect droplet ejection from the orifice. These things necessarily occur when a piezoelectric actuator is used to eject the ink drops in the combination of Rezanka in view of Williams.

Allowable Subject Matter

Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 5 discloses, "Apparatus...wherein the cross-sectional area of at least one of the inlet and outlet manifolds is such that the pressure varies between any two chambers at flow rates through each chamber of up to ten times the maximum flow through the associated orifice by an amount less than that which would give rise to significant differences in droplet ejection properties between the two chambers in the array," which was not found, taught, or disclosed in the prior arts.

Claims 1-3, 35-37, and 65 are allowed.

The following is an examiner's statement of reasons for allowance: The applicant's amendments with respect to "wherein the flow through each chamber is at least ten times greater than the maximum fluid flow of droplets ejected through the orifice of the chamber..." is persuasive.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed 12/19/05 have been fully considered but they are not persuasive.

The applicant argues, "Rezanka clearly and consistently refers to a problem arising only with thermal technology. There is no motivation to apply the teaching of Rezanka to piezoelectric technology because the problem discussed in Rezanka is generally not encountered with piezoelectric technology." The examiner respectfully disagrees. In column 1, lines 7-11, Rezanka discloses "The invention relates to a ink circulation system...and, **more particularly, to a system for circulating ink in a continuous path through a printhead to suppress the negative effects resulting from short ink latency in the ink channels and nozzles of the printhead**" (emphasis mine). The question that must be considered as to whether it is appropriate to replace the thermal actuator of Rezanka with a piezoelectric one depends on whether the invention in Rezanka is directed to solving a problem directly related to the thermal actuator itself. We see that it does not. Though the continuous ink circulation of Rezanka occurs simultaneously to the thermal ink ejection, the two concepts are distinct and not dependent on each other. The ink circulation occurs to suppress the negative effects to the nozzle resulting from short ink latency, and not as a result of thermal ejection of ink. The question that must be asked is whether an ink-jet printhead using a piezoelectric actuator that creates acoustic waves in ink would also suffer from negative effects resulting from short ink latency. The answer is affirmative. Short ink latency would cause foreign bodies to lodge themselves in the nozzle orifice regardless of what kind of ejection technique is used. As such, the ink circulation system of Rezanka would be properly used to suppress such a negative effect, regardless of the type of ink ejection used. Given that all of the applicant's arguments are based on the above base

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argument, the examiner believes that this is a sufficient response to all of the applicant's arguments.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Drury et al (US Pat 6820966) discloses a droplet deposition apparatus.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S. Liang whose telephone number is (571) 272-2148. The examiner can normally be reached on 8:30-5 Monday-Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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3/15/06
MANISH S. SHAH
PRIMARY EXAMINER